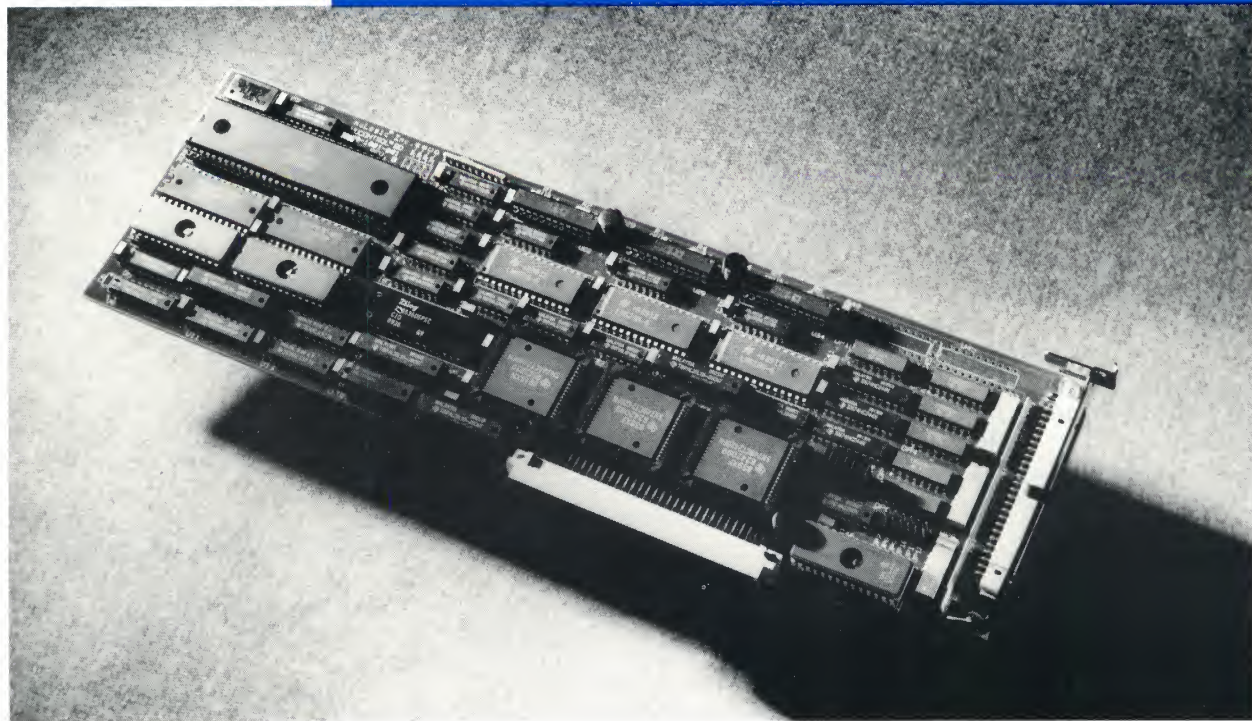


nuControl[®]

3 Axis Motion Control for the Macintosh II



FEATURES

3 Axis Servo Motor Control
Occupies Single NuBus Slot
Onboard 68000 for Real-Time Control
Easy to Program
Digital Filter Controlled Servo Loops
Programmable I/O Lines
Stored Motion Command Execution
Coordinated Multi-axis Motion Control
External I/O Triggered Motion Command Execution
High Speed Command Throughput
Limit & Home Switch Inputs
Quadrature Encoder Feedback Inputs
Analog ($\pm 10V$) or PWM Outputs
Programmable Position and Time Breakpoints
Motion Control Virtual Instruments for use with LabVIEW [®] 2 Software.

A FAST PERFORMER

nuControl is a fully programmable three axis motion controller that plugs directly into any NuBus[™] based Apple[®] Macintosh[®] II computer.

Utilizing an onboard 68000 for system supervision and indexer operations, nuControl provides real-time high speed closed loop control without sacrificing resolution or host system response. A dedicated servo controller for each axis provides a positioning range of $\pm 2^{30}$ counts.

Motion control of each individual axis is fully programmable. Commands can either be downloaded into controller memory for autonomous operation or can be sent directly from the host system for immediate execution. Motion profiles for each axis can be sequenced individually or simultaneously started for coordinated multi-axis control. Each axis can be programmed for velocity, acceleration and position control in both continuous and point to point motion.

REDUCE R&D TIME WHILE OPTIMIZING MOTION STRATEGIES

For the first time the powerful and intuitive Macintosh interface is brought to motion control applications. With the nuRunner[™] software, setup, testing and control is as easy as pointing to and clicking on the desired motion control command. Now you can debug setups, including digital filter parameters, and see immediate changes in operation as you integrate your motion system. No training is required to obtain fully functional motion control. For custom program development, device drivers are provided in C and assembly language.

The nuControl board is also available with a powerful set of Virtual Instruments (VIs) for use with LabVIEW 2, National Instrument's graphical programming software. This set of VI icons implement the entire nuControl command set along with high level motion control functions for initialization, x,y,z linear interpolation and run time control of multi-axis coordinated systems.

nuLogic[®]

AUTONOMOUS MOTION PROFILING OPERATIONS

nuControl offers event based motion profiling. Motion control command sequences can be downloaded into each of 6 independent command buffers for autonomous operations. Stored motion control sequences can be set up and then executed by external digital I/O line event triggers or commands sent by the user from the host system.

nuControl provides a Proportional-Integral - Derivative (PID) digital filter per axis, for closed loop servo control. Performance can be optimized on-the-fly for varying motor and load conditions.

nuControl Command Set

Load Position Value
Load Velocity Value
Set Direction
Load Acceleration Value
Start Motion
Kill Motion
Set Stopping Mode Type
Read Present Position
Read Present Velocity
Read Per Axis Status Info
Set Error Count Value
Enable Limit & Home Switches
Read Limit Switch Values
Select Operational Mode
Update PID Loop Parameters
Set PID Loop Sample Period
Find Home Sequence
Find Index Pulse w/Advance
Set Position Scaling Values
Set Position Offset Value
Enable Move Time Breakpoint
Enable Position Breakpoint
Multiple Axis Start
Load Input Trigger Buffers
Enable I/O Trigger Buffers
Set I/O Direction & Polarity
Read I/O Port Value
Set I/O Port Output Values
Read Communications Status

MODES OF OPERATION

Position Control: provides point to point motion based on the difference between the current and desired position. Motion occurs at a preprogrammed acceleration and velocity until the destination is reached, a limit is encountered or a stop command is executed.

Velocity Profiling: provides a preprogrammed acceleration to a desired velocity that is maintained until a new velocity value is loaded. Velocity values can be updated on-the-fly. Motion is continuous until interrupted by a limit switch input or execution of a stop command.

Jog Motion Control: motion occurs at a preprogrammed velocity in the direction selected. Motion direction can be changed at any time. Motion is continuous until interrupted by a limit switch input or execution of a stop command.

I/O CAPABILITIES

Drive output is available in two standard formats: Analog output, with a ± 10 Volt swing, or Pulse Width Modulated (PWM) output with an independent direction line.

Forward limit, reverse limit and home position switch inputs are provided for each axis. Six uncommitted digital I/O lines are available and can be configured as either inputs or outputs. Internal pull-up resistors allow all inputs to be driven by TTL or open collector lines. Inputs can be individually programmed for polarity.

ERROR HANDLING CAPABILITIES

Built-in error handling features provides for automatic motion shutdown due to limit switch inputs, positioning errors and emergency stop commands.

SPECIFICATIONS

Performance

Servo Loop Sample Period	341 μ sec
Position Range	$\pm 2^{30}$ counts
Position Accuracy	± 1 count
Velocity Range	0 - 2^{14} counts/sample
Velocity Resolution	2^{-16} counts/sample
Max. Encoder Quad. Freq.	750kHz

Dedicated Inputs (Each Axis)

Forward Limit
Reverse Limit
Home
Encoder Phase A
Encoder Phase B
Index

Dedicated Outputs (Each Axis)

Analog Motor Control	± 10 V
12 bit DAC resolution	
PWM Signal (optional)	20kHz

Configurable I/O

6 Lines
60mA output drive capability
TTL/open collector inputs

Operating Environment

0° to 70°C
5 to 95% R.H. (non-condensing)

Power Requirements

+5V	1.2A	Maximum
+12V	40mA	Maximum
-12V	75mA	Maximum

I/O Connector

50 Pin I/O header
OPTO 22 compatible

nuLogic®

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